

REMARKS:

The office action of May 3, 2005, indicates that the declaration filed with the subject patent application is defective because the title set forth therein is "PROCESS FOR PREPARING A SILICA/RUBBER BLEND" whereas the specification sets forth the title "PROCESS FOR PREPARING A SILICA RUBBER BLEND." However, it should be noted that the title given on the abstract page is identical to the title set forth in the declaration. The reference to the "SILICA RUBBER BLEND" in the title on page 1 of the specification is inconsistent with the title given in the declaration and is in error.

The title was properly provided on the abstract page, on the cover letter used in filing the subject patent application, and on the assignment of the subject patent application which was recorded on July 1, 2004, at reel: 014808 and frame: 0088. Accordingly, the title provided in the declaration is correct and the title provided on page 1 of the specification was in error.

It is not necessary to provide a new declaration since the title given therein is correct and consistent with every entry of the title other than where it was erroneously typed on page 1 of the specification. This is in accordance with 37 CFR §1.63 which requires that an oath or declaration identify the specification to which it is directed. The declaration form suggested by the Office includes spaces for filling in the names of the inventors, title of the invention, application number, filing date, and foreign priority application information. While this information should be provided, it is not essential that all of these spaces be completed in order to adequately identify the specification in compliance with 37 CFR 1.63(b)(1). Section 602 of the MPEP indicates that the following combination of information supplied in an oath or declaration filed on the application filing date with a specification are acceptable as minimums for identifying a specification and compliance with any one of the items below will be accepted as complying with the identification requirement of 37 CFR 1.63:

(A) name of inventor(s), and reference to an attached specification which is both attached to the oath or declaration at the time of execution and submitted with the oath or declaration on filing;

(B) name of inventor(s), and attorney docket number which was on the specification as filed; or

(C) name of inventor(s), and title of the invention which was on the specification as filed.

Since the declaration names the inventors and indicates that the specification was attached (it was attached at the time of execution and submission), it meets the requirements of item (A) above. Since it is only necessary to meet the requirements of one of the items delineated above this alone should be enough to show that that declaration is appropriate. However, the declaration also meets the requirements of item (B) since it names the inventors and includes the docket number of the specification as filed. In fact, the correct docket number of the subject patent application (which is consistent with the docket number shown on the declaration) is provided on the face of the office action of May 3, 2005. The requirement of item (C) is also believed to have been met because the declaration does identify the inventors and does give a title that is consistent with the title provided on the abstract page of the subject patent application. For these reasons a new declaration is not required.

An objection to the specification was made on the basis that the abstract did not meet the requirement of being 50 to 150 words in length. The abstract has been amended to meet this requirement. Accordingly, the basis of this objection has been overcome.

The title of the invention was objected to on the basis that it was not consistent with the title set forth in the declaration and because it is not descriptive. As has been pointed out, the incorrect title "PROCESS OF PREPARING A SILICA RUBBER BLEND" used on page 1 of the specification was due to a clerical error. The correct title "PROCESS OF PREPARING A SILICA/RUBBER BLEND" as used in the declaration was used correctly and consistently on the abstract page, in the cover letter used in filing the subject patent application, and in the assignment of the subject patent application. For these reasons, the objection to the title for being inconsistent with the title used in the declaration is not appropriate.

In any case, the Examiner has suggested that title of the invention should be changed to "A PROCESS FOR PREPARING A SILICA/RUBBER BLEND WHICH INCLUDES DISPERSING SILICA, A SILICA COUPLING AGENT, AND A LOW MOLECULAR

WEIGHT END-GROUP FUNCTIONALIZED DIENE RUBBER THROUGHOUT A CEMENT OF A CONVENTIONAL RUBBERY POLYMER, AND SUBSEQUENTLY RECOVERING THE SILICA/RUBBER BLEND FROM AN ORGANIC SOLVENT.” The title has been amended in accordance with the Examiner’s suggestion and the basis for objection to the title has accordingly been overcome.

Claim 16 was objected to under 37 CFR §1.75(c) as being of improper dependent form for failing to further limit the subject matter of a previous claim. This objection was made because claim 16 improperly depended upon claim 21 which does not exist. For purposes of examination, the Examiner made the assumption that claim 16 should be dependent upon claim 1. The Examiner’s assumption was correct and claim 16 has been amended so as to be dependent upon claim 1.

Claims 2-19 were objected to because they improperly recite “A process as specified . . .” wherein the process being referred to has already been originally described in independent claim 1 from which all of these claims directly or indirectly depend. The Examiner accordingly concluded that there is sufficient antecedent basis for the “process” being referred to, and suggested that claims 2-19 be amended to recite “The process as specified . . .” Claim 2-19 have been amended in accordance with the Examiner’s recommendation and this basis for objection to claims 2-19 has accordingly been overcome.

Claim 1 was rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that the applicants regard as being their invention. More specifically, claim 1 recited the limitation “the organic solvent” without having a proper antecedent basis for the term. To overcome this problem claim 1 has been amended to call for recovering the silica/rubber blend from the cement of the conventional rubbery polymer.

Claims 1-5 and 7-19 were rejected under 35 U.S.C. §102(b) as being anticipated by Visel et al (United States Patent 6,359,034) in view of the evidence set forth by Asahara et al (United States Patent 5,532,319). However, claim 1 has been amended to be further distinguished from the teachings of Visel. More specifically, claim 1 has been amended to call for the silica, the silica coupling agent, and the low molecular weight end-group functionalized diene rubber to be

dispersed throughout the cement of the conventional rubbery polymer at a temperature which is within the range of about 25°C to 130°C. As the Examiner has noted on page 8 of the office action, at least one of the non-productive mixing stages of Visel occurs at a temperature between 140°C and 190°C (see Visel at column 9, lines 33-36). Accordingly, the mixing temperature now called for in claim 1 is below the temperature range disclosed by Visel. Thus, claim 1 as amended is not anticipated by the teachings of Visel.¹

Claim 1 has also been amended to call for the low molecular weight end-group functionalized diene rubber to have a weight average molecular weight which is within the range of 50,000 to 200,000². The Examiner has noted that Visel does not expressly disclose the molecular weight of the functionalized diene elastomer that is terminated with a tetraalkoxysilane. The Examiner has accordingly cited Asahara (United States Patent 5,532,319) to show that the molecular weight of a rubbery polymer treated with tetramethoxysilane had a molecular weight of 70,000.

It should also be noted that the polymers described by Asahara are block copolymers which are used in pressure sensitive adhesive applications. This type of application is completely different from the uses of the silica/rubber blends of the present invention in rubber products, such as tires. The block copolymers described by Asahara for use in adhesive applications are also very different from the functionalized diene rubbers called for in claim 1. In light of these differences, persons having ordinary skill in the art would not equate the block copolymers described by Asahara with the rubbery polymers described by Visel and conclude that they should have the same molecular weight.

Even if the teachings of Asahara are combined with the teachings of Visel, Asahara does not suggest or imply that the functionalized diene elastomer used by Visel inherently had the same molecular weight. In fact, Asahara indicates that weight average molecular weights of the block copolymers described therein are generally within the range of 100,000 to 400,000 and are preferably within the range of 100,000 to 400,000 (see Asahara at column 4, lines 46-50). Thus,

¹ It should also be noted that Visel does not disclose the use of tetramethoxysilane. Accordingly, the Examiner did not reject claim 6 as originally filed on the basis of being anticipated by the teachings of Visel.

² This amendment is supported by original claim 2 and by the language at page 10, lines 4-6 of the specification.

the teachings of Asahara indicate that polymers can be used which have molecular weights that are far over the upper limit now called for in claim 1 (a maximum of 200,000).

Visel is silent with respect to the molecular weight of the polymer and Asahara explicitly states that polymers having molecular weights well above the upper limit now specified in claim 1 can be used. Accordingly, neither Visel nor Asahara disclose or render obvious the critical nature of utilizing a functionalized diene rubber having a maximum weight average molecular weight of 200,000. The use of a low molecular weight end-group functionalized diene rubber is a critical aspect of the invention now being claimed that is not rendered obvious by the teachings of Visel or Asahara whether viewed individually or collectively.

The teachings of Visel also fail to render the process now being claimed obvious because Visel does not disclose or suggest dispersing a low molecular weight end-group functionalized diene rubber throughout a cement of a conventional rubber. To the contrary, the process described by Visel involves blending (1) an organic solvent solution of tetraethoxysilane (TEOS), (2) an organic solvent solution of an organosilane, and (3) a catalytic amount of a condensation reaction promoter for the TEOS and the organosilane, into an elastomer solution. In the process now being claimed neither TEOS nor a condensation reaction promoter are dispersed into the cement of the conventional rubbery polymer. On the other hand, in the process now being claimed it is critical to disperse the low molecular weight end-group functionalized diene rubber into the cement of the conventional rubbery polymer and this aspect of the present invention is not disclosed or suggested by the teaching of Visel. For these reasons, claim 1 as amended is not anticipated or rendered obvious by the teachings of Visel in view of the evidence set forth by Asahara.

Claims 1, 3-5, and 18 were rejected under 35 U.S.C. §102(b) as being anticipated by Materne et al (United States Patent 6,166,108). However, claim 1 has been amended in a manner that further distinguishes it from the teachings of Materne. More specifically, the limitations of claims 2 and 7 which were not rejected over the teachings of Materne have been incorporated into claim 1. Thus, claims 1 has been amended to call for the low molecular weight end-group functionalized diene rubber to have a weight average molecular weight which is within the range of 50,000 to 200,000 and for the silica to be present at a level which is within the range of 40 phr

to 200 phr. These amendments accordingly overcome the rejection of claim 1 as being anticipated by the teachings of Materne.

The teachings of Materne can also be distinguished from claim 1 in that Materne does not disclose or suggest dispersing silica, a silica coupling agent, and a low molecular weight end-group functionalized diene rubber into the cement of a conventional rubbery polymer. The teachings of Materne fail to render claim 1 obvious because they do not disclose or suggest the addition of a low molecular weight end-group functionalized diene rubber having a weight average molecular weight which is within the range of 50,000 to 200,000 as is now called for in claim 1. The teachings of Materne also fail to disclose or suggest the utilization of a mixing temperature which is within the range of 25°C to 130°C as is now called for in claim 1. As the Examiner has noted on page 10 of the office action, in the case of Materne in one of the mixing stages the temperature is allowed to reach a temperature between 140°C and 190°C (see Materne at column 15, lines 21-24). It was further noted that the components of composition described by Materne can be mixed in three separate stages of addition at temperatures of 170°C, 160°C, and 120°C. However, Materne does not discloses or suggest the utilization of a process having a maximum temperature of 130°C. Thus, the teachings of Materne do not anticipate or render obvious the process now called for in claim 1.

Claims 1-12 and 14-18 were rejected under 35 U.S.C. §102(b) as being anticipated by the teachings of Lin et al (United States Patent 6,608,145). However, claim 1 has been amended in a manner that clearly distinguishes it from the teachings of Lin. More specifically, claim 1 has been amended to call for the silica, the silica coupling agent, and the low molecular weight end-group functionalized diene rubber to be dispersed into the cement of the rubbery polymer at a temperature which is within the range of 25°C to 130°C. This is in contrast to the process disclosed by Lin where an improvement in tensile and dynamic viscoelastic properties are reported to be attained by compounding polymers with silica at a temperature of 165°C to about 200°C (see the abstract of Lin).

The teachings of Lin can also be distinguished from the process called for in claim 1 in that Lin describes a technique wherein the silica and other ingredients are dry blended into a rubbery polymer. This is in contrast to the process now being claimed where the silica, the silica

coupling agent, and the low molecular weight end-group functionalized diene rubber are dispersed throughout the cement of a conventional rubbery polymer. The benefits realized by utilizing the process now being claimed can be seen by reviewing Example 1 and Example 2 on pages 14-16 of the subject patent application. These examples show that the silica/rubber blends made by the process of the subject invention exhibited better physical properties ($\tan \delta$, $G'50\% / G'1\%$, and $M300\% / M100\%$) and required less power consumption to formulate than did the controls which were made by a dry mixing procedure (see Table I and Table II).

As the Examiner has noted, Lin does not disclose the molecular weight of the functionalized diene rubber that is terminated with a tetraalkoxysilane. The Examiner has accordingly cited Asahara to show that the molecular weight of a rubbery polymer treated with tetramethoxysilane had a molecular weight of 70,000.

As has previously been explained, the polymers described by Asahara are block copolymers which are used in pressure sensitive adhesive applications. This type of application is completely different from the uses of the silica/rubber blends of the present invention in rubber products, such as tires. The block copolymers described by Asahara for use in adhesive applications are also very different from the functionalized diene rubbers called for in claim 1. In light of these differences, persons having ordinary skill in the art would not equate the block copolymers described by Asahara with the rubbery polymers described by Lin and conclude that they should have the same molecular weight.

Even if the teachings of Asahara are combined with the teachings of Lin, Asahara does not suggest or imply that the functionalized diene elastomer used by Lin in conventional dry blending applications inherently have the same molecular weight. In fact, Asahara indicates that weight average molecular weights of the block copolymers described therein are generally within the range of 100,000 to 400,000 and are preferably within the range of 100,000 to 400,000 (see Asahara at column 4, lines 46-50). Thus, the teachings of Asahara indicate that polymers can be used which have molecular weights that are far over the upper limit now called for in claim 1 (a maximum of 200,000).

Lin is silent with respect to the molecular weight of the polymer used. Thus, a person having ordinary skill in the art could reasonably conclude the polymers used by Lin are of

conventional molecular weights. In any case, Asahara explicitly states that polymers having molecular weights well above the upper limit now specified in claim 1 can be used. Accordingly, neither Lin nor Asahara disclose or render obvious the critical nature of utilizing a functionalized diene rubber having a maximum weight average molecular weight of 200,000. The use of a low molecular weight end-group functionalized diene rubber is a critical aspect of the invention now being claimed that is not rendered obvious by the teachings of Lin or Asahara whether viewed individually or collectively. For these reasons the process called for in claim 1 is not anticipated by or obvious in light of the teachings of Lin or the teachings of Lin in view of Asahara.

Claims 1 and 16 have been rejected as being anticipated by the teachings of Agostini et al (United States Pre-Grant Publication Number 2003/0069332) under 35 U.S.C. §102(e). The limitations of claims 2 and 7 which were not rejected over the teachings of Agostini have been incorporated into claim 1. Thus, claim 1 has been amended to call for the low molecular weight end-group functionalized diene rubber to have a weight average molecular weight which is within the range of 50,000 to 200,000 and for the silica to be present at a level which is within the range of 40 phr to 200 phr. These amendments accordingly overcome the rejection of claim 1 as being anticipated by the teachings of Agostini.

It should be noted that Agostini cannot be used to support a rejection under 35 U.S.C. §102(e)/103(a) based upon the claims pending in the subject patent application being obvious in light of the teachings of Agostini. More specifically, 35 U.S.C. §103(c) reads as follows:

“Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.”

35 U.S.C. §103(c) applies to any patent application filed on or after November 29, 1999. The subject patent application was filed on July 30, 2003. Thus, 35 U.S.C. §103(c) applies to the subject patent application. The invention of Agostini and the invention being claimed in the

subject patent application were commonly owned, or under an obligation of assignment to the same person, at the time the invention was made. Both inventions have been assigned to The Goodyear Tire & Rubber Company. A copy of the assignment of the subject patent application to Goodyear is being submitted herewith as Exhibit A (this assignment was recorded on July 1, 2004, at reel: 014808 and frame: 0088). Thus, Agostini does not qualify as prior art under 35 U.S.C. §102(e), 35 U.S.C. §102(f), or 35 U.S.C. §102(g) to support a rejection on the basis that the claims pending in the subject patent application are obvious.

Even if Agostini is a prior art reference that can properly be cited under 35 U.S.C. §103(a) against the claims pending in the subject patent application, its teachings still fail to render the invention delineated in new claim 1 obvious. This is because the teachings of Agostini fail to disclose or render obvious several critical aspects of the invention called for in claim 1. For instance, Agostini does not disclose or suggest dispersing an end-group functionalized diene rubber throughout the cement of a conventional rubbery polymer as called for in claim 1. Agostini also fails to render obvious the need for the end-group functionalized diene rubber to be of a low molecular weight of 200,000 or less as is now being claimed. The teachings of Agostini also disclose the use of thermomechanical mixing steps which are initially carried out at temperatures of at least about 155°C. This is in contrast to and actually teaches away from the invention now being claimed where the silica, the silica coupling agent, and the low molecular weight end-group functionalized diene rubber are dispersed throughout the cement of the conventional rubbery polymer at a maximum temperature of 130°C. For all of these reasons Agostini cannot support a rejection of the claims pending in the subject patent application on the basis of being obvious under 35 U.S.C. §103(a).

Claims 4, 5, and 6 were rejected under 35 U.S.C. §103(a) as being obvious over the teachings of Lin in view of Reddy et al (United States Pre-Grant Publication No. 2004/0162399). The Examiner has noted that Lin does not explicitly disclose tetramethoxysilane for use as a functionalizing agent and has cited Reddy because it discloses a silicon-acrylate impact modifier composition having tetraalkoxysilane type silicon rubber monomers including tetramethoxysilane and tetraethoxysilane. However, claim 1 was amended to make it patentable over the prior art on the basis of limitations that are not related to using any particular type of tetraalkoxysilane.

Thus, claims 4, 5, and 6 are allowable on the basis of being indirectly dependent upon claim 1 rather than on the basis of limitations specified in therein. Notwithstanding this fact, it is the applicants' position that the teachings of Reddy cannot be properly combined with the teachings of Lin. This is because the teachings of Reddy relate to silicon-acrylate impact modifiers and have virtually nothing to do with the silica-reinforced rubber compositions described by Lin. Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting that combination. ACS Hospital Systems, Inc. v. The Montefiore Hospital, 732 F.2d 1572, 221 USPQ 929 (Fed. Cir. 1984). Thus, the teachings of Reddy cannot be combined with the teachings of Lin in the present case since neither of these references suggests such a combination. Persons having ordinary skill in the art would have no logical basis for combining the teachings of Reddy which relate to impact modifiers with the teachings of Lin which relate to silica filled rubbery compositions. There is no teaching in either of the cited prior art references that would motivate a person having ordinary skill in the art to combine certain select teachings of the references while ignoring others.³

Claim 20 has been rejected under 35 U.S.C. 103(a) as being obvious over the teachings of Lin in view of the teachings of Sandstrom (United States Patent 6,378,582). The Examiner has noted that Lin does not specifically disclose the tire structure called for in claim 20, but that Sandstrom does disclose a tire which is comprised of a generally toroidal-shaped carcass with an outer circumferential tread, two spaced beads, at least one ply extending from bead to bead and sidewalls extending radially from and connecting said tread to said beads, wherein said tread is adapted to be ground-contacting. However, claim 1 was amended to make it patentable over the teachings of Lin on the basis of process limitations that are not related to any particular tire structure. Accordingly, claim 20 is patentable by virtue of being dependent upon claim 1 which

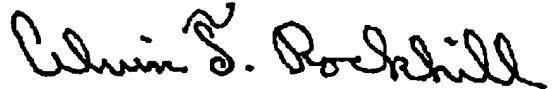
³ At the time the subject invention was made, persons having ordinary skill in the art would not have piecemealed together the teachings of the references being cited in the manner suggested by the Examiner. Obviousness is not determined by the application of hindsight, or retrospect, with the knowledge of the patentee's discovery. Rather, it is determined as of the time of the invention, based solely on the knowledge disclosed by the prior art as a whole. Republic Industries, Inc. v. Schlage Lock Co., 592 F.2d 963, 200 USPQ 769 (1979); Schnell v. Albright-Nell Co., 348 F.2d 444, 146 USPQ 322 (1965). A prima facia case of obviousness has not been established. Thus, the claims pending in the subject patent application are not obvious in light of the teachings of the cited prior art references.

is allowable over Lin for the reasons set forth heretofore.

It should be noted that some minor errors have been corrected in the paragraph beginning of line 1 of page 1 and in the paragraph beginning on line 28 of page 6.

The specification and claims pending in the subject patent application have been amended in a manner that overcomes all objections and rejections under 35 U.S.C. §102, 35 U.S.C. §103, and 35 U.S.C. §112, second paragraph. The subject patent application is accordingly now in a condition for allowance and allowance of all pending claims is now respectfully requested.

Respectfully submitted,



Attorney for Applicant(s)

Alvin T Rockhill, Reg. No. 30,417
The Goodyear Tire & Rubber Company, D/823
1144 East Market Street
Akron, Ohio 44316-0001
Telephone: (330) 666-4659